BAROCLINIC INERTIA-GRAVITY (f[](i) WAVE TURBULENCE INDUCED BY BAROTROPIC TIDES

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Observations of internal tides have a long history which now includes altimeter-based observations. Barotropic tide scattered by ocean floor features is known to be the main mechanism of internal tide generation. However, it is also known that "the internal tides, when observed al all, are buried in a high back ground 'noise' of the internal wave continuum" (Wunsch, 1 975). What has not been appreciated until recent l y is the profound role played in tidal d ynamics by nonl inear resonant w:ivc-wave i nteract ions among i nternal waves. These interactions induce spectral cascades of energy, momentum and wave. action resulting in broad-band frequency - and wavenumber spectra of temperature-, velocity-, and SS11 oscillations (i.e., "wave. turbulence"). Based on a recent theory of BIG wave turbulence [J. Phys. (Ice.amp,r., 26(7), 1996], many old observations find a new interpretation. 1 'or example, the kinetic energy peak at the inertial frequency is explained as a result of an inverse. cascade of wave action; and various spectra reported from in situ and sate.t]itc measurements arc. shown to be caused by t he B] G wave t urbulence generated by barotropic tides. Spectral cascades in BIG waves (converting tidal energy into other forms at the long- and slmrt-scale boundaries of the wave spectrum) arc. pointed out as a mechanism of tidal energy dissipation. Finally, we report an attempt at inferring thermocline characteristics from altimeter observations of .SS1 I spectra by using the BIG wave turbulence theory.

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